# TECHNICAL REVIEW DOCUMENT OPERATING PERMIT 950PWE035

to be issued to:

KN Wattenberg Transmission Company Frederick Compressor Station Weld County Source ID 1230184

> Prepared by David H. Webb January 6, 1997 Revised by Jacqueline Joyce July 23, 1997

### I. Purpose:

This document establishes the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA, the Public and other interested parties. Conclusions made in this report are based on information provided by the applicant in the Title V application submitted February 1, 1995, supplemental technical submittals of May 25, August 29, 1995, March 28, 1997 and May 28, 1997, as well as numerous phone contacts.

## II. Source Description:

This source is primarily classified as a natural gas compression facility defined under Standard Industrial Classification 4922. Gas is compressed to specification for transmission to sales pipelines using internal combustion engines to power compressor units. Gas is also dehydrated in contact with triethylene glycol in a dehydration unit to reduce the moisture content of the compressed gas to acceptable levels.

The facility is located near the community of Fort Lupton in Weld County, CO, in an area designated as attainment for all criteria pollutants. This source is considered to be a major source in an attainment area (Potential to Emit > 250 tons/year) and is considered major for purposes of Prevention of Significant Deterioration (PSD) regulations (See discussion under 'Applicable Requirements' for the engines below). Future modifications to this facility which are in excess of significance levels as defined in Colorado Regulation No. 3, Part A, Section I.B.58, would result in the application of PSD regulations. Facility emissions are as follows:

<u>Pollutant</u>	Potential to Emit (tpy)	Actual (tpy)
NO <sub>x</sub>	438.2	359.8
VOĈ	163.9	143.3
CO	216.4	183.2
HAPs	42.2	25.9

Potential to Emit is based on the maximum design capacities of the units regulated

in the Operating Permit, as reported in the Title V application. Actual emissions are based on 1994 fuel usage for the engines as obtained during a April 1995 site inspection, the 12/20/95 APEN for the glycol dehydrator reporting actual emission for 1995, and fugitive emission calculations submitted with a supplement to the Title V application.

This facility is within 100 kilometers of Rocky Mountain National Park, a Federal Class I designated area. The Federal Land Manager for the Park will therefore receive a copy of the Public Comment notice. There are no affected states (within a 50 mile radius) associated with this facility.

This facility is not subject to 112(r), the Accidental Release Requirements.

KN Wattenberg Transmission Company (KN) certified to non-compliance with the VOC and CO emission limitations contained in the Construction Permits (in effect at the time) for the reciprocating engines (Units EU-41, 42, see below) in their original Title V application of February 1, 1995. Following technical review of the permit application, KN also resubmitted certifying to non-compliance with PSD provisions for the dehydration unit (EU-01, see below).

#### III. Emission Sources:

The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

<u>Units EU-41, 42</u> - Cooper Bessemer Quad Model 12Q115HC Two Cycle Internal Combustion Engines, Site Rated at 4000HP Each, Low NO $_{\rm x}$  Design. Natural Gas Fired. Serial Nos. 48799, 48715.

#### Discussion:

**1. Applicable Requirements-** Prior to Title V application submittal, Colorado Construction permits 13WE199 and 12WE804 defined applicable requirements for these engines. As part of the application process, KN proposed new emission factors based on manufacturer's data. Therefore, the aforementioned permits were revised to reflect emission rates consistent with the manufacturer's information. The Initial Approval permits (issued 4/3/96) for the modifications required stack testing to verify these emission rates. The testing was conducted on August 28 and 29, 1996 and demonstrated compliance with the emission limitations in the Initial Approval permits. Final Approval for these permits has been recommended as a result. The following terms and conditions of the revised Construction Permits have been incorporated into the Draft Operating Permit as Applicable Requirements: Hourly and annual emission limits for NO<sub>x</sub>, CO, and VOC; hourly and annual fuel use limitations; 20% Opacity limit. Note that limitations for PM-10 were not included in the Operating Permit because particulate emissions are not of regulatory concern from engines burning

natural gas. A PSD permit was issued by the EPA for Unit EU-42 on November 21, 1981. This unit was installed one year after EU-41 in August of 1982, increasing emissions by greater than the 40 tpy significance level defined in 40 CFR 52.21(b)(2)(I). The permit limited emissions of  $NO_{\chi}$  to 450 ppm, with the requirement to conduct a one-time stack test to verify compliance. The permit also required notification to the EPA of construction progress, stack testing dates and results.

During Public Comment a discrepancy was pointed out for NOX and fuel consumption limits on these two identical engines. The source requested that all limits be the same for both engines. A calculation error in the construction permit for EU-42 caused the discrepancy. Therefore, the emissions and fuel consumption limits for EU-42 will be the same as EU-41.

**2. Emission Factors-** Emissions from these reciprocating engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, specific properties of the natural gas being burned, and engine design specifications. The pollutants of concern are Nitrogen Oxides (NO<sub>x</sub>), Carbon Monoxide (CO) and Volatile Organic Compounds (VOC). Small quantities of Hazardous Air Pollutants (HAPs) and particulate matter less than 10 microns in size (PM-10) are also emitted. The emission factors for NO<sub>x</sub>, VOC, and CO are based on stack testing data for an identical engine in the KN system (listed below). The factor for NO<sub>x</sub> is significantly lower than the AP-42 (US EPA) factor for emissions from 2-cycle, lean burn engines (Table 3.2-2, 10/96).

<u>Pollutant</u>	Stack Test Emission Factor	AP-42 Factor
$NO_{x}$	5.5 grams/bhp-hr	9.98 g/hp-hr
CO	2.8 "	0.93 "
VOC	1.2 "	4.99 "

These emission factors have been converted to the units of lbs/MMBtu, as outlined on the attached Engineering Calculation worksheet, for use in determining compliance.

**3. Monitoring Plan-** Conditions 1.1 to 1.7 of the Operating Permit list the Monitoring and Recordkeeping provisions necessary to verify compliance with Applicable Requirements for this engine. Specific monitoring guidance for Internal Combustion Engines in Attainment areas has been developed by the Division as shown on the attached Grids titled "Compliance/Scenario Summary - Gas Fired IC Engines." This Grid defines emission calculation and measurement of fuel use as minimum requirements for this engine. Since emissions of Nitrogen Oxides are being calculated using an emission factor below the EPA's AP-42 factor, portable monitoring using a flue gas analyzer for this pollutant will be required on a quarterly basis. Flue gas analyzer testing for Carbon Monoxide will also be required because the relationship between  $NO_{\chi}$  and CO emission rates from reciprocating engines

is critical for determining engine operating condition. The Grid also requires a one time stack test for engines with PSD or BACT requirements, as is the case with Unit EU-42. The August 28 and 29, 1996 testing will satisfy this requirement, and no additional testing will be required under the Operating Permit. Note that stack testing indicated a maximum  $NO_{\chi}$  ppm concentration of 273 over high and low load conditions. Therefore it is assumed that the requirements of the 11/25/81 PSD permit have been demonstrated, and no additional monitoring requirements have been incorporated with respect to that permit.

The Division has agreed that the use of natural gas as fuel will be acceptable for monitoring of Opacity requirements.

**4. Compliance Status-** KN certified to non-compliance with the CO and VOC emission limitations in effect at the time KN submitted their original Title V application. However, Revised Air Pollution Emission Notices (APENs) for the engines requesting increased emission levels were submitted with the OP application. The original permit limits were calculated based on the best emission factors available at the time. The proposed factors create a higher emission limitation without triggering any new applicable requirement. It is assumed that the engines were always emitting at the current level, but knowledge at the time of original permit issuance was limited to the use of AP-42 factors. Stack testing has demonstrated compliance with the revised emission rates. Natural gas is the exclusive fuel for this engine, and it is assumed that the 20% opacity limitation is not exceeded. Therefore, the Division considers the engines in compliance with current regulations.

# <u>Unit D01</u> - Custom Triethylene Glycol Dehydration Unit, Rated at 60 MMSCFD. Controlled by Sivalls R-BTEX Condenser.

## Discussion:

- 1. Applicable Requirements- Colorado Construction permit 95WE781 (Initial Approval) was issued on May 7, 1996 limiting Volatile Organic Compound emissions and the cubic feet of gas processed from this unit. Terms of this permit are considered Applicable Requirements. KN performed a required stack test of this unit on November 15, 1996 which demonstrated compliance with the proposed emission limits. Final Approval was recommended for this permit as a result. Therefore, the terms have been directly incorporated into the Title V permit. A future Maximum Achievable Control Technology (MACT) standard is being developed for operations at Oil and Gas facilities which may apply to emissions from glycol dehydration units.
- **2. Emission Factors-** Triethylene glycol is contacted with the natural gas stream to remove moisture. This glycol-water mixture is heated in the still vent portion of the unit which drives off the water and some entrained VOCs. Emissions from this process were predicted using the Gas Research Institute's GLYCalc Model. Emission factors of VOC and various HAPs are

dependent upon the variables input into this Model. These variables include glycol recirculation rate, cubic feet of gas processed, inlet temperature and pressure of the processed wet gas, and percentage breakdown by volume of constituents in the natural gas. Combustion emissions from the heater are exhausted through a separate stack. The heater at this site is rated at 1.5 MMBTU/hr and falls under the insignificant activity category of Colorado Reg. 3, Part C, Section II.E.3.k. Therefore, these combustion emissions do not need to be regulated in the Operating Permit.

3. Monitoring Plan- The Gas Research Institute's manual for their GlyCalc Version 3.0 Model defines the wet gas (inlet) temperature, glycol recirculation rate, and gas BTEX content as the three critical inputs to the Model for triethylene glycol units. Changes to the gas flow rate and inlet pressure do not radically affect emissions from glycol dehydrators. Therefore, parametric monitoring of the inlet temperature, recirculation rate and BTEX content will be required as part of the monitoring plan for this site as detailed in Condition 2.1 of Section II of the Operating Permit. Inlet pressure and flow rate will be held constant for modeling purposes. Modeling will only be required when the measured values for inlet temperature, recirculation rate and BTEX content do not meet the comparison criteria as related to the stipulated values in Condition 2.1 of the permit. The specific parameter values listed in the permit were supplied by KN and define a worst-case scenario for dehydrator emissions.

This unit is controlled by an R-BTEX condensing technology. A maximum outlet temperature requirement for the condenser has been incorporated into the permit with daily monitoring to ensure adequate VOC and HAP capture efficiency.

**4. Compliance Status-** KN fulfilled their obligation to submit an Air Pollution Emission Notice by December 31, 1994 to report emissions from the still vent portion of this unit. Following determination that VOC emissions at the reported level would trigger PSD requirements, KN installed controls on the unit to limit VOC emissions below the 40 tpy significance level. Stack testing conducted November 15, 1996 demonstrated compliance with the reduced emission limitations. Therefore, the Division currently considers the dehydration unit to be operating in compliance with all applicable requirements.

## **Unit F001**- Fugitive Emissions of VOCs from Equipment Leaks

#### Discussion:

1. Applicable Requirements- The Division has made the determination that Fugitive VOC emissions from equipment leaks at gas compression or processing facilities must be calculated and evaluated for the appropriate permitting requirements. KN submitted calculations documenting VOC emissions from this plant. Total facility emissions of VOC exceed the 5 ton per year permitting threshold in Colorado Regulation 3, Part B, Section III.D.3. Therefore, permitting requirements apply to this source of emissions, and appropriate emission limitations have been included for this point as

applicable requirements.

This plant does not meet the definition of an Onshore Natural Gas Processing Facility in 40 CFR 60 Subpart KKK which contains requirements for inspection and monitoring of fugitive leaks at these facilities. Therefore, Subpart KKK does not apply to this site.

- **2. Emission Factors-** KN has calculated emissions from equipment leaks based on emission factors from EPA's Protocol for Emission Leak Estimates (Table 2-6 (EPA 453/R-95-026)). Factors are multiplied by the number of components of each type (e.g. Compressor Seals) and the VOC weight percentage in the organic portion of the gas stream as determined in the most recent analysis. EPA factors are given in terms of Total Organic Compounds.
- **3. Monitoring Plan-** As a means of recordkeeping, KN must maintain a running tally of the number of process valves, relief valves, pump seals, compressor seals and flanges/connections in order to recalculate the emissions from fugitive leaks. Calculation results will be compared to the annual VOC limit to determine compliance. No component count has been specified in the Operating permit to allow flexibility under the VOC emission limitation.

KN must maintain a log on site of identified leaks and the actions taken to repair those leaks per Condition 3.2 of the Operating Permit.

**4. Compliance Status-** KN submitted a APEN reporting the current 38.6 tpy emission level, in response to a technical request, on May 25, 1995. KN has fulfilled their obligation to submit an APEN for this source of emissions, and therefore is in compliance for this point.

## IV. Insignificant Activities

## **Emissions from Purging/Venting during Start-up or Shut-Down**

The dimensions of the largest engine in the KN system, a 4000 hp unit at the Dougan Station, and an assumption of an extremely conservative 20% VOC content of the gas stream were utilized for these calculations. Calculations indicated a VOC emission of less than 2 tpy, below the APEN reporting level established in Colorado Regulation 3.

## Storage Tanks

On August 5, 1991, the Division issued Construction Permit 89WE372 for condensate tanks and a methanol tank. Estimated actual emissions of Volatile Organic Compounds are 3.9 tons per year. As part of the Title V application process, KN claimed that these tanks fell under the insignificant activity category for condensate storage tanks under 40,000 gallons (Colorado Regulation No. 3, Part C, Section II.E.3.ddd). KN subsequently requested cancellation of this permit in a letter dated May 17, 1995. The Division agrees with KN's position. Therefore, these storage tanks are not specifically regulated under the Operating Permit for

this site, and are listed as Insignificant Activities in Appendix A.

# V. Alternative Operating Scenarios

## **Temporary Engine Replacement-**

KN has requested that temporary replacement of engines during times of engine overhaul be considered an Alternative Operating Scenario under the Operating Permit if they can determine through flue gas analyzer testing that emissions will be equal to or less than those from the engine replaced. The Division has concluded that temporary replacement will be defined as less than a 3 month period. KN must be willing to accept a determination of non-compliance should flue gas analyzer testing indicate that the emission factors for the engine in question exceed those defined in the Operating Permit. Non-compliance will be considered to have occurred from the day the engine was replaced.

#### VI. Permit Shield

The listed regulation citations for the Permit Shield requested by KN in the Title V application are identical to the listed Applicable Requirements for each unit. The 'Specific Conditions' in Section III of the Operating Permit are intended to shield a source from enforcement of non-applicable requirements. Therefore, no specific regulations were included in Section III of the Operating Permit.